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NOTES ON NORTH AMERICAN POLISTES WITH DESCRIPTIONS OF NEW SPECIES AND SUBSPECIES

(Hymenoptera, Vespidae)

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The North American *Polistes* wasps can be divided taxonomically in to 4¹ species groups which are widely distributed over the country. These may be called the *canadensis*, *exclamans*, *fuscatus* and *major* groups. The structural characters on which they are based have been nicely summarized by Bequaert.² The first two can be distinguished from the last two by their more slender form and by the only slightly convex second tergite. The *canadensis* group is further characterized by the distinctly striate propodeum, well punctured mesopleuron and raised pronotal collar. In the *exclamans* group the propodeum is finely striate except in the median groove, the mesopleuron has microscopic punctures only, and the pronotal collar is low and blunt. The *major* group can be separated from the *fuscatus* group by the almost invariably present prepectal suture on the mesopleuron of the former. Also, in the males of the *fuscatus* group the apical sternite has a mediobasal tubercle.

Thanks are due the U. S. National Museum, American Museum of Natural History, California Academy of Sciences, University of California, and Oregon State Agricultural College for the opportunity of studying their extensive collections. Also, Dr. Joseph Bequaert of the Museum of Comparative Zoology at Harvard has contributed and loaned many specimens as well as furnished suggestions and criticisms based on his extensive knowledge of *Polistes*.

¹A fifth group is represented by *P. pacificus* (Fabricius), a new record of which from Brownsville, Texas, has been communicated to me by Dr. Joseph Bequaert.

²Bequaert, J., 1940. An introductory study of *Polistes* in the United States and Canada with descriptions of some new North and South American forms. Jour. N. Y. Ent. Soc. 48:1-32.

Holotypes will be deposited in the California Academy of Sciences. Paratypes will be distributed to the above-named institutions as their number permits.

I. P. CANADENSIS GROUP

P. canadensis (Linn.) in its typical mahogany-colored form occurs in Central and South America. In the United States it is known only from southern Arizona. Other subspecies in this country are the brownish-red *kaibabensis* Hayward from Grand Canyon of Arizona, the yellow, black and orange *navajoe* Cresson from southwestern U. S., and in western Texas the largely orange and black *comanchus* Saussure. Another species of the group, *annularis* Linn. usually has a mahogany thorax and mostly black abdomen. It occurs commonly in eastern and midwestern U. S. and has previously been considered as a subspecies of *canadensis*. However, the male genitalia of *annularis* differ in having the aedeagus considerably stouter.

II. P. EXCLAMANS GROUP

Only one species of this group, *exclamans* Viereck, occurs in the U. S. Structurally speaking, it is separated with difficulty and by male facial characters only from related Mexican and Central American species. Specimens from Lower California appear to be *exclamans* but differ consistently in markings. These are described below.

Polistes exclamans lineonotus R. Bohart, new subspecies

Male—Black, marked with yellow and some reddish. Face mostly yellow, black across vertex and on occiput. Thorax with many yellow spots and lines including 2 pairs of lines on mesonotum and 2 pair on propodeum, pronotum partly reddish. Legs black and yellow or reddish-yellow, hind femora all black except for basal and apical spots. First 2 abdominal tergites mostly black with broad apical yellow bands, rest of abdomen mostly yellow tinged with reddish. Wings brownish red. Length to apex of second tergite 11.5 mm.

Female—Markings about as in male except as follows: face partly suffused with reddish, vertex reddish with black-rimmed ocelli, submedian yellow lines of mesonotum edged with red, mid femur all black except at apex, abdomen mostly brownish red with black at base of segments only, except on tergite I where it runs to apical yellow border. Apical margins of tergites II - III narrow and suffused with reddish, those following broader. Length to apex of second tergite 13.0 - 15.0 mm.

Holotype, male, C. A. S. No. 6002, 10 miles east of SAN IGNACIO, LOWER CALIFORNIA, September 30, 1941 (E. Ross and G. Bohart).

Paratypes, 30 females collected by E. Ross, G. Bohart and A. Michelbacher from the following Lower California localities: San Domingo, Venancio, Concepcion Bay, 20 miles N. Comondu; 1 female collected by W. H. Mann at Loreto, Lower California.

The paired yellow lines on the mesonotum of this subspecies differentiate it from the typical form where such lines are absent or very indistinct.

III. P. FUSCATUS GROUP

Included here are *fuscatus* Fabricius from eastern U. S., *variatus* Cresson from central U. S. to the Rocky Mountains, *pallipes* Lepeletier from northern U. S., *centralis* Hayward from southwestern U. S., *aurifer* Saussure from far western U. S. and several localized named forms. These appear to be subspecies, and intermediates occur where they come together geographically. Also included as subspecies by Bequaert (1940, see footnote 2) were *rubiginosus* Lepeletier, *metricus* Say, *bellicosus* Cresson, *apachus* Saussure, *flavus* Cresson, and *hunteri* Bequaert. Although close to *fuscatus* and often structurally indistinguishable in the female, males of these species differ from each other as well as from *fuscatus* in the size and arrangement of the teeth of the aedeagus. The shape of the male clypeus and its position on the face are also useful differentiating characters. In *fuscatus* it is noticeably more concave than in the other species. An addition to the list is the following unnamed form.

Polistes rossi R. Bohart, new species ✓

Male—Light brownish-red and yellow, black restricted to thoracic sutures, margins of ocelli, and mandible teeth. Yellow with orange tint, especially on abdomen, occurring as follows: Clypeus and frons to front of ocellus, anterior and posterior margins of pronotum, tegula basally, narrow propodeal stripes, spot above mid coxa, other indistinct areas on sides of thorax, tibiae and first 2 tarsal segments above, submedially emarginate apical margins of abdominal tergites, similar margins of sternites II-IV, indistinct free spot on tergite II. Wings pale reddish. Clypeus very slightly convex, apex produced at an angle of about 87° (less acute in some paratypes), distance between lateral ocellus and compound eye about 1.3 times diameter of front ocellus, distance between

antennal bases about 1.5 times diameter of front ocellus, last antennal segment in lateral view slightly convex beneath. Propodeum rather sharply cleft at middle, with about 25 distinct and well separated striae. Teeth of aedeagus small (as compared with *fuscatus*), shallow, set close together, similar in size. Length to apex of second tergite 13 mm.

Female—Marked about as in male except that face is yellowish red and propodeum is without stripes. Clypeus produced sharply so that angle is 90° or less. Distance between lateral ocellus and compound eye slightly less than twice diameter of front ocellus. Propodeum as in male but with striae as a rule even more distinct. Length to apex of second tergite 13.5 - 16.5 mm.

Type, male, C. A. S. No. 6003, 10 miles east of SAN IGNACIO, LOWER CALIFORNIA, September 30, 1941 (E. S. Ross and G. E. Bohart). Paratypes, 17 males and 9 females, collected by Ross and G. Bohart except as noted, all from Lower California: 10 mi. E. San Ignacio, 20 mi. S. El Arco, 20 mi. W. San Augustine, El Marmol, Cataviñia, Canipole, La Rivera, Concepcion Bay (Ross and A. Michelbacher), 15 mi. E. San Ignacio (Ross and A. Michelbacher).

This species occurs with a similarly marked subspecies of *fuscatus* which is probably referable to *centralis* but has the abdomen more reddish than in specimens from southwestern U. S. However, *rossi* can be separated on structural characters of the head and propodeum. In other species of the *fuscatus* group the lateral ocelli are separated from the compound eyes in the male by a little more than 2 front ocellus diameters, the male antennal bases are separated by about 2 front ocellus diameters and the last antennal segment in the male is concave beneath in profile. In the females of the other *fuscatus* group species, the clypeal apex is slightly obtuse, and the lateral ocelli are separated from the compound eyes by a little more than 2 ocellus diameters. The propodeum in the *fuscatus* group is subject to some variation in striae, and in *rubiginosus*, *apachus*, and *metricus* the ridges may be as strong as in some *rossi*. In the subspecies of *fuscatus*, however, fine striae only are found.

P. hunteri Bequaert was treated as a subspecies of *fuscatus* by Bequaert but the small and convex male clypeus and the minutely-toothed aedeagus are characteristic. The known forms of *hunteri* average smaller than any other North American *Polistes*.

In addition to typical *hunteri*, which ranges over much of eastern and southern U. S., there are at least 3 other subspecies. One of these, *neotropicus* Bequaert, notable for the large amount of yellow on the propodeum, was described from Central America but ranges into Texas, New Mexico, and southern Colorado. The other previously unnamed subspecies are described below.

Polistes hunteri californicus R. Bohart, new subspecies

Polistes fuscatus anaheimensis of authors (not Provancher)

Male—Light red marked with yellow as follows: Mandible mostly, face to near ocellar triangle, outer orbit narrowly above and broadly below, anterior and posterior margins of pronotum, spot below tegula, large mesosternal spot, 2 spots at front margin of scutellum, front margin of postscutellum, narrow propodeal stripes, membranous areas at abdominal insertion, front and mid coxae beneath, exterior stripes on femora and tibiae, tarsi partly, rather broad bands on abdominal segments, indented medially, most of tergites III to VII, attached spots on I and II. Black restricted to mandible teeth, irregular area around ocelli, stains along most thoracic sutures and spots on coxae above. Wings reddish, veins brown. Clypeus (as in typical subspecies) small, somewhat convex, removed from eye by about 1.5 times diameter of front ocellus; lateral ocellus removed from eye by about 3.5 times diameter of front ocellus. Last antennal segment not concave or shiny beneath. Aedeagus slender, with many small teeth of about equal size. Length to apex of second tergite 12.5 mm.

Female—Markings about as in male but with yellow more restricted. Most of face including part of clypeus often reddish, mesosternum, coxae and femora except at apex, without yellow. Clypeus adjoining compound eye for about 1 ocellus diameter, lateral ocellus removed from eye by about 3 times diameter of front ocellus. Length to apex of second tergite 10.0 to 14.0 mm.

Holotype, male, C. A. S. No. 6004, ANTIOCH, CONTRA COSTA Co., CALIF. (P. D. Hurd). *Paratypes*, 36 males and 88 females from the following California Counties: Solano (Green Valley), Shasta (Cottonwood), Yolo (Davis, Putah Canyon, Madison), Sacramento, (Sacramento), Stanislaus (Del Puerto Canyon), San Francisco (San Francisco), Eldorado (Chile Bar), Sonoma (Cloverdale), Contra Costa (Antioch), Napa (St. Helena), Lake (Middletown), Alameda (Tesla and Niles Canyon), Inyo (Big Pine), Santa Clara (Stanford University), Monterey (Paraiso Springs), Tulare (Sequoia Park), Madera (Bates), Fresno (Firebaugh), Los Angeles (Saugus, Sierra Madre, Pomona, West Los

Polistes anaheimensis
a synonym of *P. fuscatus*
auct. de Saunders

Angeles), Orange (Silverado Canyon), Riverside (Andreas Canyon, Banning, Hemet), San Bernardino (El Cajon), San Diego (Borego, San Diego, San Felipe Valley, Jacumba).

The species is common in California at low to moderate elevations as far north as Shasta County. It hibernates particularly under loose bark of cottonwood or eucalyptus and in company with *P. fuscatus aurifer*. Both wasps are stylopized by *Xenos peckii* Kirby but *aurifer* much more frequently so. The nests of *californicus* are usually small but I have collected one containing about 250 cells. It was long oval in shape, with a double pedicel near the middle and individual cells measuring about 5.0 mm. in diameter.

Polistes hunteri clarionensis R. Bohart, new subspecies

Male—Body mostly dull brownish red with restricted yellow and black markings. Yellowish are: face as far up as eye emargination, mid and fore coxae mostly in front, indistinct lines on femora, margins of pronotum weakly, base of abdominal sternite II. Black are: large spot on vertex enclosing ocelli, fourth and following antennal segments except narrowly beneath, spot at middle of humeral slope, thoracic sutures including mesonotum all around and a median stripe extending back as far as tegulae, basal areas on tergites I and II, irregular areas on sternites. Wings reddish, veins brown. Structural characters as in *hunteri* and *californicus*. Length to apex of second tergite 12.0 mm.

Female—Markings about as in male except as follows: small black spot running from each antennal insertion to clypeus, fourth and following antennal segments all black except for tip of twelfth, mesonotum more extensively black, legs with yellow only at tips of fore and mid femora, abdominal tergites (in some paratypes) with traces of sublateral yellow spots. Length to apex of second tergite 12.0 - 16.0 mm.

Holotype, male, C. A. S. No. 6005, CLARION ISLAND, REVILLAGIGEDO GROUP, Pacific Ocean, April 27, 1925 (H. H. Keifer).

Paratypes, 8 males and 49 females, same data as type; 2 females, Clarion Island, March 22-24, 1932 (M. Willows, Jr.), 3 females, Clarion Island, February 27, 1928, (T. Craig).

This subspecies is easily recognized by the decidedly bicolored antennae, the all red propodeum except for a median black stripe, and the absence of yellow on the first abdominal tergite. Mr. H. H. Keifer has told me that nests were numerous near the ground in catsclaw bushes.

IV. P. MAJOR GROUP

Typical *P. major* Beauvois occurs in Mexico and Central America and occasional specimens have been taken in southern Arizona along with the much more common mahogany-colored subspecies, *castaneicolor* Bequaert. The typical subspecies also occurs at Brownsville, Texas, according to information received from J. Bequaert in a letter. In addition I have studied 8 specimens, including both sexes, which represent various intergrades between *major* and *castaneicolor* and which were collected with the other forms in Arizona. In western Texas there is a subspecies, *bakeri* Bequaert, characterized by extensive black areas on the thorax. In southeastern California, subspecies *palmarum* Bequaert can be recognized by its pale reddish color and somewhat restricted yellow markings. In Lower California a similar but more deeply colored subspecies occurs which is described below.

Polistes major slevini R. Bohart, new subspecies = *P. m. palmarum* Bequaert

Male—Orange red and yellow with restricted black markings. Mandible, clypeus and frons yellow, ocellar area and occiput irregularly blackened, rest of head reddish. Outlines of pronotum, spots on mesopleuron, coxae beneath, scutellum, postscutellum, area of abdominal insertion yellow, rest of thorax reddish except for blackened sutures, coxae partly and metapleural spots. Abdominal segments with bases of I and II narrowly black, rest reddish with broad apical yellow bands so that IV to VII appear all yellow. Wings reddish brown, veins brown. Length to apex of second tergite 15.0 mm.

Female—Markings about as in male except that ocellar black area is confined to rims of ocelli, scutellum sometimes with small reddish spots. Length to apex of second tergite 17.0 mm.

Holotype, male, C. A. S. No. 6006, LA PAZ, LOWER CALIFORNIA, June 28, 1919 (J. R. Slevin).

Paratypes, 1 male and 6 females from the following Lower California localities: Sierra de la Laguna, Agua Caliente, La Paz and Las Parras.

This subspecies by virtue of its reddish and yellow pattern most closely resembles *palmarum*. However, the red color is darker and the black markings of *slevini*, notably along the pleural sutures, toward the leg bases, at the middle of the propodeum, and at the base of tergites I and II, are absent in *palmarum*.

Polistes major var.
Slevini's m. appears
rather closely sim-
ilar to *whitelyi*
not seen. Bequaert's
only from Cal. Sono